

Hypertension

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HYPERTENSIVE URGENCY AND EMERGENCY

Hypertensive urgency is defined as a BP greater than 180/120 mm Hg. BPs in this range causing impending or progressive organ dysfunction are hypertensive emergencies. The distinction is an important one because hospitalization and parenteral antihypertensive agents are typically recommended for a hypertensive emergency, whereas with hypertensive urgency, one can modify the oral antihypertensive regimen and provide close outpatient follow-up over the following few days.



ACUTE MYOCARDIAL INFARCTION

See “Acute Coronary Syndromes.”



ACUTE RENAL FAILURE

Symptoms

- Generally asymptomatic
- Oliguria or anuria
- Flank pain
- Anorexia, nausea, vomiting

Signs

- Confusion, generalized weakness
- Edema, rales, jugular venous distention

Workup

- BMP: look for elevations in serum creatinine suggestive of compromised renal function, as well as hyperkalemia or hyponatremia
- Urinalysis
 - Presence of proteinuria suggests renal insufficiency but will not differentiate acute from chronic

- If prominent RBCs or casts are present, a separate renal process must be considered because this is a rare finding in cases of solely hypertensive nephrosclerosis.
- Chest x-ray: to assess pulmonary edema

Comments and Treatment Considerations

Goal of treatment is to reduce systemic vascular resistance without compromising glomerular filtration rate.

Specific electrolyte abnormalities should be managed as needed. A nephrology consultation for possible dialysis in cases of uremic symptoms (encephalopathy, pericarditis), severe volume overload, severe acid-base imbalance, uncontrollable severe hyperkalemia, or hyponatremia should be considered.



AORTIC DISSECTION

Symptoms

- Sudden tearing posterior chest, back, or abdominal pain, typically excruciating
- Syncope, lightheadedness

Signs

- Pulse deficits in the carotid, brachial, femoral, or dorsalis pedis arteries
- Variations in pulse or blood pressure, including between the left and right arms
- New murmur of aortic insufficiency: low pitched, short early diastolic murmur

Workup

- Chest x-ray: looking for widened mediastinum
- ECG and cardiac enzymes to help rule out ischemic causes of chest pain
- Echocardiography: transesophageal is preferred because of its higher sensitivity and specificity. Chest CT with IV contrast and MRI are alternatives.

Comments and Treatment Considerations

Type A, involving the ascending aorta, requires immediate surgical referral. Type B, or descending ruptured aneurysms, can typically be treated medically.



HYPERTENSIVE ENCEPHALOPATHY

Symptoms

- Nonfocal neurologic deficits including headache (typically insidious onset), delirium or disorientation, and speech disturbances. Seizure and coma are late findings.

- Visual changes
- Nausea and vomiting

Signs

- Brisk tendon reflexes
- Papilledema, with retinal hemorrhages and exudates

Workup

- Head CT without contrast, or MRI with T2 weighting: Cerebral edema involving white matter of the posterior portions of both cerebral hemispheres, especially the parieto-occipital regions

Comments and Treatment Considerations

Consider alternative causes for neurologic symptoms. If hypertensive in origin, BP control alone should improve or resolve symptoms. The lower limit of cerebral blood flow autoregulation is reached when BP is reduced by 25%, and cerebral ischemia can be precipitated with rapid reductions more than 50%. The goal is to reduce mean arterial pressure (MAP) by no more than 25% within the first hour, and if stable, to 160/100 mm Hg over the next 2 to 6 hours.

Use caution with sodium nitroprusside as it may cause a precipitous lowering of BP. Other reasonable choices include fenoldopam and labetalol.



ILLICIT DRUG USE

See Chapter 41.



POORLY CONTROLLED ESSENTIAL HYPERTENSION

Due either to lack of compliance with treatment or previously undiagnosed disease; this is a diagnosis of exclusion, so patients presenting with new onset severe hypertension should have other hypertensive emergency diagnoses considered and ruled out.

Symptoms

- Chronically uncontrolled hypertension is largely an asymptomatic disease ++++

Signs

- Grades III and IV hypertensive retinopathy (hemorrhages, exudates, or papilledema)

Workup

- Review medical records for prior BPs.
- ECG: left ventricular hypertrophy suggests chronically uncontrolled hypertension.

- Consider echocardiography if any clinical suspicion for heart failure
- Serum creatinine and urine microalbumin, indicating underlying renal disease

Comments and Treatment Considerations

- In the absence of hypertensive emergency, the patient can be started on appropriate oral antihypertensive medication and sent home with close follow-up.



PREECLAMPSIA/ECLAMPSIA

Symptoms

- Edema (especially of the face) ++++
- Epigastric pain, nausea, or vomiting
- Visual changes

Signs

- Sudden and rapid weight gain
- Oliguria
- Seizure

Workup

- Labs: CBC (checking for hemoconcentration or hemolysis, as well as thrombocytopenia), liver function tests (LFTs), serum creatinine (to evaluate renal function), uric acid, urinalysis, and/or 24-hour urine for proteinuria
- Ultrasound to evaluate for growth restriction and oligohydramnios

Comments and Treatment Considerations

Treatment of BP generally not recommended if SBP is less than 160. If BP control is indicated, consider labetalol, hydralazine, or methyldopa. Avoid use of ACE or angiotensin-receptor blocker (ARB) due to teratogenic risk.

Magnesium infusion may be indicated for seizure prophylaxis.

Consult with an obstetrician about the proper management of pregnancy/labor (including possible induction or cesarean delivery).

SECONDARY HYPERTENSION

Secondary hypertension should be considered in a patient with elevated BP ($\geq 140/90$ in adults and >95 th percentile for age and height in children) along with symptoms, signs, or laboratory tests that suggest an identifiable etiology. The following situations should raise the clinician's index of suspicion:

- Hypertension before age 30 (especially with a negative family history) or after age 55
- Resistant or refractory hypertension despite good compliance with three or more antihypertensive agents (including a diuretic)

- Malignant hypertension (severe hypertension and signs of end-organ damage)
- Acute rise in BP in a previously stable, well-controlled hypertensive patient
- Acute rise in creatinine concentration after starting an ACE-I inhibitor or ARB-II



PRIMARY RENAL DISEASE

Primary renal disease, renal parenchymal disease, and renal artery stenosis (RAS) are common causes of secondary hypertension in adults and children.

Symptoms

- Edema, especially flash pulmonary edema
- Dyspnea
- Leg claudication (with RAS)

Signs

- Acutely elevated BP above baseline
- Abdominal bruit
- Decreased/nonpalpable ankle pulses

Workup

- BMP and complete urinalysis, looking for elevated creatinine concentration (estimate glomerular filtration rate [GFR]), as well as proteinuria, hematuria, casts, etc.
- Renal ultrasonography (with Doppler evaluation of renal vasculature) is a good initial imaging study; follow-up CT, MRI, or magnetic resonance angiography (MRA) may be required.

Comments and Treatment Considerations

In most patients with renal disease and diabetes or significant cardiovascular risk factors, use of ACE inhibitors reduces both renal and cardiovascular risk. A trial of medical therapy can be appropriate for many patients with RAS, but renal angioplasty (with possible stent placement) should be considered in certain subgroups, including patients with poorly controlled hypertension, patients with only one functioning kidney, and patients with recurrent CHF.



OBSTRUCTIVE SLEEP APNEA

Obstructive sleep apnea (OSA) is a mechanical obstruction of the upper airway that is an independent risk factor for hypertension.

Symptoms

- Daytime somnolence ++++
- Snoring or irregular nocturnal breathing patterns (often noticed by bed partners) ++++

Signs

- Obesity

Workup

- Sleep study with oxygen saturation

Comments and Treatment Considerations

Primary treatment of OSA with continuous positive airway pressure (CPAP) can result in improved BP. Beta-blockers may be more effective than other medications.

**PRIMARY ALDOSTERONISM**

Primary aldosteronism is suggested by the combination of hypertension, hypokalemia, and metabolic acidosis.

Symptoms

- Often asymptomatic, but can have headaches, easy fatigue, and weakness

Signs

- Rare and nonspecific

Workup

- Plasma aldosterone (high) and plasma renin activity (low)
- CT scan of adrenal glands (looking for unilateral adenoma versus bilateral hyperplasia)

Comments and Treatment Considerations

Adrenalectomy is the treatment of choice for unilateral adenomas, but results in blood pressure control in only one third of patients. Mineralocorticoid receptor blockers (such as spironolactone or eplerenone) should be used in patients with adrenal hyperplasia.

**CUSHING SYNDROME**

This etiology will include Cushing syndrome and other excess glucocorticoid states, such as chronic steroid use.

Symptoms

- Proximal weakness
- Depression or anxiety

Signs

- Cushingoid facies
- Central obesity
- Hyperpigmentation (purple striae and ecchymoses) and hirsutism

Workup

- Low-dose dexamethasone suppression test or 24-hour urinary free cortisol

Comments and Treatment Considerations

Surgery is the primary treatment for pituitary and adrenal adenomas. If long-term steroid use is unavoidable, the minimum effective steroid dose should be used.

**PHEOCHROMOCYTOMA**

Pheochromocytoma is often listed in the differential of secondary hypertension, but accounts for only about 0.2% of cases. It is more common in children than adults.

Symptoms

- Classic triad of paroxysmal headaches, palpitations, and diaphoresis

Signs

- Labile hypertension

Workup

- 24-hour urinary vanillylmandelic acid, metanephrine, and normetanephrine

Comments and Treatment Considerations

Surgery is the treatment of choice. Hypertensive crises are effectively treated with IV nitroprusside.

**COARCTATION OF THE AORTA**

Coarctation of the aorta, more commonly encountered in children, is a congenital, varying constriction of the aorta at any point from the transverse arch to the iliac bifurcation.

Symptoms

- Usually asymptomatic; weakness or leg pain after exercise

Signs

- Delayed femoral pulse and decreased femoral blood pressure
- Heart murmur (variable types)

Workup

- Four-point pulses and BP
- Echocardiogram

Comments and Treatment Considerations

Surgical correction is essential. Patients require lifelong follow-up. Hypertension may recur, even after surgery.

Table 27-1. Drug and Supplement Causes of Hypertension

DRUG CLASS	EXAMPLE
Antiparkinsonian agents	Bromocriptine
Food	Licorice (carbenoxolone), alcohol
Heavy metals	Lead, mercury
Illicit drugs	Phencyclidine (PCP), cocaine, MDMA (Ecstasy)
Immunosuppressants	Cyclosporine, tacrolimus, corticosteroids
Monoamine oxidase inhibitors	Phenelzine, tyramine foods
NSAIDs (including COX-2 inhibitors)	Ibuprofen
Oral contraceptives	Estrogen
Stimulants	Nicotine, amphetamines, caffeine
Sympathomimetics	Pseudoephedrine, bronchodilators
Tricyclic antidepressants	Amitriptyline
Weight loss agents	Phentermine, sibutramine, ma huang

COX, Cyclooxygenase; NSAIDs, nonsteroidal antiinflammatory drugs.

Drugs and supplements that cause hypertension and their associated symptoms/signs are extensive and varied. History is key. See [Table 27-1](#) for a partial list of potential offenders.

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